
SCIENCE

Science may be broadly defined as the study of facts, principles, and theories that describe the world around us and as a set of processes by which people systematically acquire and refine this knowledge. Science literacy requires, then, that students understand not only the fundamental concepts of science but also the ways in which scientific information is generated and refined and the historical development of key theories. They should understand the limits of scientific knowledge and grasp what distinguishes science from non-science.

Students must go beyond the simple knowing of facts to the development of a level of conceptual understanding that enables them to use and apply what they have learned. A student demonstrates conceptual understanding by representing a concept in multiple ways (through words, or by designing graphs or charts pictorially or mathematically, as appropriate) and by using a concept accurately to explain observations and make predictions. Both aspects of understanding – representing and explaining – are required to achieve science literacy.

The relationship between evidence and explanation is key to how science works. There is no single set of steps that constitutes *the scientific method*; rather, there are different traditions in different scientific fields about what is investigated and how. All traditions require evidence, logic, and good arguments, and involve hard work and imagination. There *is* an array of investigative skills that are essential if one is to deepen conceptual understanding and appreciate how new knowledge is produced. These skills include observing, predicting, classifying, inferring, measuring, questioning, hypothesizing, experimenting, interpreting data, and constructing and explaining models.

Students learn these skills firsthand by participating in scientific inquiry, moving beyond

traditional laboratory work and conducting different kinds of investigations: controlled experiments; systematic observations, such as field studies; designs, such as building models or creating inventions; and non-experimental research studies, which use multiple sources such as print, the Internet, and computer databases. Working both as part of a team and individually, a student progresses to investigations that are increasingly systematic and quantified, and which culminate in oral and written reports that demonstrate the ability to communicate technical material in a clear, logical manner to a variety of audiences. By the time students are taking high school courses, they should demonstrate the ability to frame a question, design an approach, gather and analyze data, describe sources of error, write a technical report, and respond to critiques.

In January 2001, the San Diego Unified School District Board of Education formally adopted the state academic standards for science for use in the district. The Board made its decision to ensure clear links to the state assessment and accountability systems, the curriculum adoption process, and state-sponsored professional development. The state science standards are available at the following Web site:

www.cde.ca.gov/be/st/ss/index.asp

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Elementary Science Courses (Grades K–6)

Strands (Themes) Emphasized

Grade	Kindergarten	1	2	3	4	5	6
Required	State science test in grade 5 assesses students' understanding of the standards covered in grades 4 and 5, those standards build on the K–3 standards and curriculum. Thus it is imperative that students in all grades complete the district curriculum units for physical, earth and space, and life sciences. Students are expected to receive 180 minutes of science instruction (including investigation and experimentation) per week in grades K–5.						Grade 6 elementary curriculum should follow the recommendations for grade 6 middle school.
Strands (Themes) Emphasized	Physical science Earth/space science Life science						Focus on Earth science

KINDERGARTEN

STRANDS EMPHASIZED

Physical science
Earth science
Life science
Investigation and Experimentation

COURSE DESCRIPTION

By the end of Kindergarten, students understand that properties of materials can be observed, measured, and predicted; different types of plants and animals inhabit the earth; and Earth is composed of land, air, and water. They communicate their understandings orally and through drawing.

BASIC TEXTS AND TEACHING GUIDES

"Trees," *FOSS Full Option Science System*, Delta Education, 2007.

"Fabric," *FOSS Full Option Science System*, Delta Education, 2007.

"Animals," *FOSS Full Option Science System*, Delta Education, 2007.

Harcourt Science, Grade K, Harcourt School Publishers, 2000.

GRADE 1

STRANDS EMPHASIZED

Physical science
Earth science
Life science
Investigation and Experimentation

COURSE DESCRIPTION

By the end of first grade, students understand materials come in different forms (solids, liquids, and gases); plants and animals meet their needs in different ways; and weather can be observed, measured, and described. They record observations, collect data, and explain their thinking using pictures, numbers, bar graphs, and written statements. They describe two positions of an object (e.g., above and next to), refine their observations when discrepancies exist, and draw pictures that portray some features of the object.

BASIC TEXTS AND TEACHING GUIDES

"Air and Weather," *FOSS Full Option Science System*, Delta Education, 2007.

"Solids and Liquids," *FOSS Full Option Science System*, Delta Education, 2007.

“Living Things,” *Insights*, Education Development Center, 1994.

Harcourt Science, Grade One, Harcourt School Publishers, 2000.

GRADE 2

STRANDS EMPHASIZED

Physical science

Earth science

Life science

Investigation and Experimentation

COURSE DESCRIPTION

By the end of second grade, students understand the motion of objects can be observed and measured; plants and animals have predictable life cycles; and Earth is made of materials that have distinct properties and provide resources for human activities. They observe, diagram, and record data using magnifiers and metric measurement tools. They compare and sort common objects by two attributes (e.g., color, shape, texture, size, or weight), identify patterns, and make predictions. They record data using bar graphs with appropriately labeled axes and follow oral instructions for a scientific investigation.

BASIC TEXTS AND TEACHING GUIDES

“Pebbles, Sand, and Silt,” *FOSS Full Option Science System*, Delta Education, 2007.

“Ball and Ramps,” *FOSS Full Option Science System*, Delta Education, 2007.

“Life Cycle of a Butterfly”

Harcourt Science, Grade Two, Harcourt School Publishers, 2000.

GRADE 3

STRANDS EMPHASIZED

Physical science

Earth science

Life science

Investigation and Experimentation

COURSE DESCRIPTION

By the end of third grade, students understand that energy and matter have multiple forms and can be

changed from one form to another; light has a source and travels in a direction; adaptations in physical structure or behavior may improve an organism’s chance for survival; living organisms depend on one another and on their environment for survival; and objects in the sky move in regular and predictable patterns. Students repeat observations to collect accurate data, make predictions, analyze the data, compare results, and develop logical conclusions. They understand that scientific investigation is based on evidence, not opinion.

BASIC TEXTS AND TEACHING GUIDES

“Structures of Life,” *FOSS Full Option Science System*, Delta Education, 2007.

“Physics of Sound,” *FOSS Full Option Science System*, Delta Education, 2007.

TRACS: Objects in the Sky, Kendall-Hunt, 2000.

Harcourt Science, Grade Three, Harcourt School Publishers, 2000.

GRADE 4

STRANDS EMPHASIZED

Physical science

Earth science

Life science

Investigation and Experimentation

COURSE DESCRIPTION

By the end of fourth grade, students understand electricity and magnetism are related effects that have many useful applications in everyday life; all organisms need energy and matter to live and grow; living organisms depend on one another and on their environment for survival; the properties of rocks and minerals reflect the processes that formed them; and waves, wind, water, and ice shape and reshape Earth’s surface. Students follow written instructions for a scientific investigation. They collect data using measurement and estimation and use graphs to interpret the data. They form and test predictions (in multiple trials) and draw conclusions about their evidence.

BASIC TEXTS AND TEACHING GUIDES

“Earth Materials,” *FOSS Full Option Science System*, Delta Education, 2007.

“Magnetism and Electricity,” *FOSS Full Option Science System*, Delta Education, 2007.

TRACS: Investigating Ecosystems, Kendall-Hunt, 2000.
Harcourt Science, Grade Four, Harcourt School Publishers, 2000.

Harcourt Science, Grade Five, Harcourt School Publishers, 2000.

GRADE 5

STRANDS EMPHASIZED

Physical science

Earth science

Life science

Investigation and Experimentation

COURSE DESCRIPTION

By the end of fifth grade, students understand elements and their combinations account for all the varied types of matter in the world; plants and animals have structures for respiration, digestion, waste disposal, and transport of materials; water on Earth moves between the oceans and land through the processes of evaporation and condensation; energy from the Sun heats Earth unevenly, causing air movements that result in changing weather patterns; and the solar system consists of planets and other bodies that orbit the sun in predictable paths. Students plan, conduct, and write reports of simple investigations using independent and controlled variables, appropriate measurement tools, and graphs. They support their conclusions with evidence from qualitative and quantitative data.

BASIC TEXTS AND TEACHING GUIDES

“Water,” *FOSS Full Option Science System*, Delta Education, 2007.

“Mixtures and Solutions,” *FOSS Full Option Science System*, Delta Education, 2007.

“Human Body Systems,” *Insights*, Kendall/Hunt, 1997.

GRADE 6

STRANDS EMPHASIZED

Earth science

Investigation and Experimentation

COURSE DESCRIPTION

Focus on Earth Science. In this general science course students learn concepts in physical, life, and earth sciences, with a focus on earth science. Students conduct experiments utilizing appropriate tools, technology, and graphs and communicate their conclusions orally and in writing. Students interpret events and identify changes that occur in geologic time. They explore the interactions that occur between the various earth systems and the implications those interactions have on their daily lives. Students continue to develop their abilities to conduct inquiry, create explanations based on evidence, and understand the nature of science.

BASIC TEXTS AND TEACHING GUIDES

American Geological Society, *Investigating Earth Systems: Our Dynamic Planet*, It’s About Time, 2002.

“Environments,” *FOSS Full Option Science System*, Delta Education, 2007.

“Landforms,” *FOSS Full Option Science System*, Delta Education, 2007.

Holt Science and Technology: Earth Science, Holt, Rinehart and Winston, 2001.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

Middle-level Science Courses (Grades 5–8)

Diagram of Districtwide* Course Sequence

Grade Level			
5 [†]	6 [†]	7	8
Science 5th (6210)	Science 6th (6006)	Science 7th (6003) Science 7th— Computers and Technology 1,2 (6008, 6009)	Science 8th (6005) Science 8th 1,2 Advanced (6041, 6042)

* Pilot courses and courses approved by the Board of Education to be offered at specific sites only are described in *District Pilot and Site-Adopted Courses: A Supplement to the Course of Study, K–12*, item number 3470.

[†] For middle school students in grades 5 and/or 6.

The following course descriptions are arranged by **grade level**. Refer to the chart above for guidance.

SCIENCE 5TH (6210)

Grade level: 5

Prerequisites: None

Course duration: Semester or year course; may be repeated for credit.

Subject area in which graduation credit is given:

Does not apply

Options for Instructional Settings: This course may also be taught in the following settings:

- Cluster: 6210C
- Sheltered: 6210L
- Seminar: 6210S

COURSE DESCRIPTION

This course is for fifth-grade students in a middle school scheduling environment. By the end of fifth grade, students understand elements and their combinations account for all the varied types of matter in the world; plants and animals have structures for respiration, digestion, waste disposal, and transport of materials; water on Earth moves between the oceans and land through the processes of evaporation and condensation; energy from the Sun heats Earth unevenly, causing air movements that result in changing weather patterns; and the solar system consists of planets and other bodies that orbit the sun in predictable paths. Students plan, conduct, and write reports of simple investigations

using independent and controlled variables, appropriate measurement tools, and graphs. They support their conclusions with evidence from qualitative and quantitative data.

BASIC TEXTS AND TEACHING GUIDES

“Water,” *FOSS Full Option Science System*, Delta Education, 2007.

“Mixtures and Solutions,” *FOSS Full Option Science System*, Delta Education, 2007.

“Human Body Systems,” *Insights*, Kendall/Hunt, 1997.

Harcourt Science, Grade Five, Harcourt School Publishers, 2000.

SCIENCE 6TH (6006)

Grade level: 6

Prerequisites: None

Course duration: Semester or year course; may also be taught as a six-, nine-, or 12-week portion of an 18-week wheel course. May be repeated for credit.

Options for Instructional Settings: This course may also be taught in the following settings:

- Bilingual: 6006B
- Cluster: 6006C
- Sheltered: 6006L
- Seminar: 6006S
- Collaborative: 6006G

Subject area in which graduation credit is given:

Does not apply

Note: Special education students are offered an identical course (7114) that provides access to the core curriculum while allowing for accommodations in the pacing of course content.

COURSE DESCRIPTION

Focus on Earth Science. In this general science course students learn concepts in physical, life, and earth sciences, with a focus on earth science. Students conduct experiments utilizing appropriate tools, technology, and graphs and communicate their conclusions orally and in writing. Students interpret events and identify changes that occur in geologic time. They explore the interactions that occur between the various earth systems and the implications those interactions have on their daily lives. Students continue to develop their abilities to conduct inquiry, create explanations based on evidence, and understand the nature of science.

BASIC TEXTS AND TEACHING GUIDES

American Geological Society, *Investigating Earth Systems: Our Dynamic Planet, It's About Time*, 2002.

"Environments," *FOSS Full Option Science System*, Delta Education, 2007.

"Landforms," *FOSS Full Option Science System*, Delta Education, 2007.

Focus on Earth Science, Pearson Prentice Hall, 2008.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

SCIENCE 7TH (6003)

Grade level: 7

Prerequisites: None

Course duration: Year course

Subject area in which graduation credit is given:

Does not apply

Options for Instructional Settings: This course may also be taught in the following settings:

- Bilingual: 6003B
- Cluster: 6003C
- French: 6003F
- Collaborative: 6003G
- Sheltered: 6003L
- Seminar: 6003S
- Spanish: 6003E

Note: Special education students are offered an identical course (7115) that provides access to the core curriculum while allowing for accommodations in the pacing of course content.

COURSE DESCRIPTION

Focus on Life Science. This general science course allows grade 7 students to meet the requirement for completion of one year of science. Students extend

their ability to conduct inquiry, develop explanations based on evidence, and expand their understanding of the nature of science. They learn concepts in physical, life, and earth sciences, with a focus on life science. Students are given the opportunity to explain the relationships of these topics to their daily lives. A variety of inquiry-based technology experiences are used to promote learning for all students.

This course is intended to help students meet state science standards.

BASIC TEXTS AND TEACHING GUIDES

Lawrence Hall of Science, *Science and Life Issues*, Lab Aids, 2000.

Focus on Life Sciences, McDougal Littell, 2007.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

SCIENCE 7TH—COMPUTERS AND TECHNOLOGY 1,2 (6008, 6009)

Grade level: 7

Prerequisites: None

Course duration: Two semesters

Subject area in which graduation credit is given:

Does not apply

Options for Instructional Settings: This course may also be taught in the following settings:

- Cluster: 6008C, 6009C
- Collaborative: 6008G, 6009G
- Sheltered: 6008L, 6009L
- Seminar: 6008S, 6009S

Note: Students who complete this course successfully will meet the district's computer literacy graduation requirement.

COURSE DESCRIPTION

Science 7th—Computers and Technology is a two-semester, technology-oriented course in general science that fulfills the district's computer-literacy requirement for 7th grade while meeting state education standards in science. Students extend their ability to conduct inquiry, develop explanations based on evidence, and expand their understanding of the nature of science. They are given the opportunity to explain the relationships of these topics to their daily lives. The course integrates

computers into the science curriculum using a technology-rich approach that increases students' scientific and technological literacy while preparing them for success in the increasingly technology-driven world of the 21st century.

This course is intended to help students meet state science standards.

BASIC TEXTS AND TEACHING GUIDES

Lawrence Hall of Science, *Science and Life Issues*, Lab Aids, 2000.

Focus on Life Sciences, McDougal Littell, 2007.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

SCIENCE 8TH (6005)

Grade level: 8

Prerequisites: None

Course duration: Year course

Subject area in which graduation credit is given:

Does not apply

Options for Instructional Settings: This course may also be taught in the following settings:

- Bilingual: 6005B
- Sheltered: 6005L
- French: 6005F
- Spanish: 6005E
- Collaborative: 6005G

Note: Special education students are offered an identical course (7770) that provides access to the core curriculum while allowing for accommodations in the pacing of course content.

COURSE DESCRIPTION

Focus on Physical Science. This general science course allows grade 8 students to meet the requirement for completion of one year of science. Students extend their ability to conduct inquiry, develop explanations based on evidence, and expand their understanding of the nature of science. They learn concepts in physical, life, and earth sciences, with a focus on physical science. Students are given the opportunity to explore the relationships of these topics to their daily lives. A variety of strategies and experiences will be used that promote learning for all students.

This course is intended to help students meet state science standards.

BASIC TEXTS AND TEACHING GUIDES

InterActions in Physical Science, It's About Time, 2007.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

SCIENCE 1,2 8TH ADVANCED (6041, 6042)

Grade level: 8

Prerequisites: Interest in science and successful achievement in previous courses

Course duration: Two semesters

Subject area in which graduation credit is given:

Does not apply

Options for Instructional Settings: This course may also be taught in the following settings:

- Cluster: 6041C, 6042C
- Collaborative: 4061G, 4062G
- Sheltered: 6061L, 6062L
- Seminar: 6042S, 6042S

COURSE DESCRIPTION

Focus on Physical Science. This general science course allows grade 8 students to meet the requirement for two semesters of science. It is an accelerated course offered to interested and high achieving science students. Students extend their abilities in investigation, inquiry, and the nature of science, emphasizing in particular the quality of explanations and citing of evidence for these explanations. Concepts in physical, life, and earth sciences are explored in depth, with a focus on physical science.

This course is intended to help students meet state science standards.

BASIC TEXTS AND TEACHING GUIDES

InterActions in Physical Science, It's About Time, 2007.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

High School Science Courses (Grades 9–12)

Diagram of Districtwide* Course Sequence

Grade Level			
9	10	11	12
Biology 1,2 (6111, 6112)[†] Biology 1,2 Advanced (6121, 6122) Chemistry 1,2 (6211, 6212) Chemistry 1,2 Honors (6221, 6222) <i>Earth Science 1,2 (6023, 6024)[§]</i> Physics 1,2 (6311, 6312) Physics 1,2 Advanced (6321, 6322)			
		<i>Science Research Techniques 1,2 (6431, 6432)</i>	
		Biology 1,2 AP (6191, 6192) Chemistry 1,2 AP (6291, 6292)** Environmental Science 1,2 AP (6455, 6456) Marine Science 1,2 (6441, 6442) Physics B 1,2 AP (6391, 6392)** Physics C 1,2 AP (6393, 6394) Physiology 1,2 (6151, 6152)	

* Pilot courses and courses approved by the Board of Education to be offered at specific sites only are described in *District Pilot and Site-Adopted Courses: A Supplement to the Course of Study, K–12*, PeopleSoft item number 3470.

[†] **Boldface** denotes courses that are currently accepted by the University of California as meeting its **d** (laboratory science) entrance requirement. However, each district high school seeking recognition by the university of these courses for its students must include the courses on its individual UC-approved list.

[§] *Italics* denote courses that are currently accepted by the University of California as meeting its **g** (electives) entrance requirement. However, each district high school seeking recognition by the university of these courses for its students must include the courses on its individual UC-approved list.

** Students who are sufficiently advanced in their mathematics and science preparation may, with the permission of the instructor and their parents, take Physics B 1,2 AP or Chemistry 1,2 AP in grade 10 as their first course in these subjects.

Districtwide Courses in Grades 9–12 that Meet SDUSD High School Graduation Requirements for Science		
Six semester credits (3 years) required: one year of life science (biology or other University of California [UC]-approved laboratory science course in the 'd' subject area); one year of physical science (physics, chemistry, or other UC-approved laboratory science course in the 'd' subject area); and one additional year of UC-approved science coursework in the 'd' (laboratory science) or 'g' (elective) subject areas.		
Life Science Courses (d) Biology 1,2 Biology 1,2 Advanced Biology 1,2 AP Physiology 1,2*	Physical Science Courses (d) Chemistry 1,2 Chemistry 1,2 Honors Chemistry 1,2 AP Physics 1,2 Physics 1,2 Advanced Physics B 1,2 AP Physics C 1,2 AP	Additional Science Courses Earth Science 1,2 (g) Environmental Science 1,2 AP (d)* Marine Science 1,2 (d)*

* UC and California State University consider this course to be "interdisciplinary" rather than a life science or a physical science. Because of prerequisites, students will meet the district's life science and physical science requirements before they take this course.

The following course descriptions are arranged **alphabetically**. Refer to the chart on page SCI-8 for guidance.

BIOLOGY 1,2 (6111, 6112)

Grade level: 9–12

Prerequisites: None

Course duration: Two semesters

Subject area in which graduation credit is given:
Science

Options for Instructional Settings: This course may also be taught in the following settings:

- Bilingual: 6111B, 6112B
- Sheltered: 6111L, 6112L
- Collaborative: 6111G, 6112G

Note: Special education students are offered an identical course (7785, 7786) that provides access to the core curriculum while allowing for accommodations in the pacing of course content.

COURSE DESCRIPTION

College Preparatory Course (P). This introductory course is designed to meet college entrance requirements and prepare students for the worlds of school, work, and citizenship. It builds on physical science concepts, and emphasizes mechanisms for the functioning and continuity of organisms. Unifying themes of biology are stressed (evolution, homeostasis, energy, matter and organization, continuity, development, and ecology) and the application and relevance of biology to students' lives and to society. Inquiry and the nature of science are important content elements.

Class organization is student centered. Learning begins with questions and includes experimental laboratory activities, inquiry, cooperative group work, class discussions, reading, and critical thinking analyses leading to deeper conceptual understanding and increased knowledge in the key areas of biology. State science standards are addressed. All student activities have clearly defined goals for both the content material and thinking skills involved. Multiple forms of assessment, including authentic assessment, are used. Laboratory activities have clearly labeled safety precautions and hazardous waste disposal procedures.

BASIC TEXTS AND TEACHING GUIDES

BSCS, *Biology: A Human Approach*, Kendall/Hunt, 2003.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

BIOLOGY 1,2 ADVANCED (6121, 6122)

Grade level: 9–12

Prerequisites: None

Course duration: Two semesters

Subject area in which graduation credit is given:
Science

Options for Instructional Settings: This course may also be taught in the following settings:

- Cluster: 6121C, 6122C
- Sheltered: 6121L, 6122L
- Seminar: 6121S, 6122S

COURSE DESCRIPTION

College Preparatory Course (P). This is a first year course intended for students with the interest and ability to extend their study of biology beyond the basic course, and/or who are contemplating a science-related career but are not prepared to take Advanced Placement Biology as their first biology course. It covers all the elements of the regular course, including the same inquiry and cooperative strategies, but the pace will be faster, and it will go into greater depth in selected areas. It builds extensively on concepts learned in physics and chemistry and is more quantitative. It addresses state science standards. There are no cluster or seminar sections; students desiring a more rigorous course should take the Advanced Placement Biology course.

BASIC TEXTS AND TEACHING GUIDES

Campbell et al., *Biology: Concepts & Connections*, Prentice-Hall, 2003.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

BIOLOGY 1,2 ADVANCED PLACEMENT (6191, 6192)

Grade level: 11–12

Prerequisites: Chemistry 1,2 and Biology 1,2, or equivalents; the commitment to succeed in rigorous AP content. Some students with high achievement in Chemistry 1,2 may qualify to take this as their first course in biology.

Course duration: Two semesters

Subject area in which graduation credit is given: Science; weighted (see note below)

COURSE DESCRIPTION

Honors Preparatory Course (HP). In this course students engage in learning activities equivalent to those of a freshman biology course at the university level. Students successful in this course attain a depth of understanding of fundamental biological concepts and are able to demonstrate that understanding, orally and in writing, with clarity and logic. The application and relevance of biology to students' lives and to society are stressed, and inquiry and the nature of science are important content elements. Materials used for this course differ qualitatively from those used in other biology courses in both rigor and content, and in the complexity of laboratory experiences. Laboratory activities have clearly labeled safety precautions and hazardous waste disposal procedures. The students' learning activities are intended to prepare them to succeed in the Advanced Placement Examination in Biology, and all enrolled students are expected to take this AP test.

Note: Students who complete this course successfully but do not sit for the corresponding AP examination will receive *unweighted* credit, for course 6191U, 6192U. See Administrative Procedure 4770, section C.3.

BASIC TEXTS AND TEACHING GUIDES

Campbell, *Biology*, 7th ed., Prentice Hall, 2005.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

CHEMISTRY 1,2 (6211, 6212)

Grade level: 9–12

Prerequisites: Algebra 1-2 or equivalent

Course duration: Two semesters

Subject area in which graduation credit is given: Science

Options for Instructional Settings: This course may also be taught in the following settings:

- Bilingual: 6211B, 6212B
- Sheltered: 6211L, 6212L
- Collaborative: 6211G, 6212G

Note: Special education students are offered an identical course (7787, 7788) that provides access to the core curriculum while allowing for accommodations in the pacing of course content.

COURSE DESCRIPTION

College Preparatory Course (P). This introductory course is designed to meet college entrance requirements and prepare students for the worlds of school, work and citizenship. Students learn the fundamental concepts and knowledge of chemistry through thematic units that develop thinking and analytical skills as well as traditional chemistry subject matter and problem solving. The course addresses state science standards. Class organization is student centered. Learning begins with questions and includes experimental laboratory activities, inquiry, cooperative group work, class discussions, reading, mathematics, and critical thinking analyses leading to deeper conceptual understanding. Inquiry and the nature of science are emphasized, and all student activities have clearly defined goals for both the content material and thinking skills involved. Laboratory activities have clearly labeled safety precautions and hazardous waste disposal procedures.

This course is intended to help students meet state science standards.

BASIC TEXTS AND TEACHING GUIDES

Stacy, *Living by Chemistry*, Key Curriculum Press, 2004.

REFERENCE TEXT

Wilbraham, *Addison-Wesley Chemistry*, Scott Foresman Addison-Wesley, 2002.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

**CHEMISTRY 1,2 ADVANCED
PLACEMENT (6291, 6292)**

Grade level: 11–12

Prerequisites: Physics 1,2, Chemistry 1,2, Algebra 1-2, and Intermediate Algebra 1-2, or equivalents; commitment to succeed in rigorous AP content; concurrent enrollment in college preparatory mathematics

Course duration: Two semesters

Subject area in which graduation credit is given: Science; weighted (see note below)

COURSE DESCRIPTION

Honors Preparatory Course (HP). In this elective, usually second-year course in chemistry, students are challenged with learning activities equivalent to those of a general chemistry course usually taken during the first year of college. Those successfully completing this course will attain a depth of understanding of chemical concepts, significant laboratory experiences, and knowledge of current directions that will prepare them for the Advanced Placement Test in General Chemistry, and all enrolled students are expected to take this AP test.

Note: Students who complete this course successfully but do not sit for the corresponding AP examination will receive *unweighted* credit, for course 6291U, 6292U. See Administrative Procedure 4770, section C.3.

BASIC TEXTS AND TEACHING GUIDES

Zumdahl, *Chemistry*, 6th ed., McDougall Littell, 2003.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

CHEMISTRY 1,2 HONORS (6221, 6222)

Grade level: 9–12

Prerequisites: Above-average achievement in previous science course(s) and in Algebra 1-2 or equivalent; Physics 1,2 and Chemistry 1,2

recommended; concurrent enrollment in Intermediate Algebra 1-2 or equivalent recommended; a desire to succeed in a rigorous college-level course environment

Course duration: Two semesters

Subject area in which graduation credit is given: Science; weighted

Options for Instructional Settings: This course may also be taught in the following settings:

- Cluster: 6221C, 6222C
- Sheltered: 6221L, 6222L
- Seminar: 6221S, 6122S

COURSE DESCRIPTION

Honors Preparatory Course (HP). Successful completion of this course earns recognition of honors (i.e., weighted) credit by the University of California. Courses meeting UC criteria for honors designation must be comparable in workload and emphasis to Advance Placement, International Baccalaureate, or introductory college courses. A course syllabus, with laboratory activities, and a comprehensive final examination are required. Students who complete this course successfully will gain a depth of understanding of chemical concepts and processes. They will also develop their critical thinking and analytical skills. The class includes experimental laboratory activities, class discussions, reading, and critical analysis leading to deeper understanding, and it emphasizes human inquiry and the nature of science.

This course is intended to help students meet state science standards.

BASIC TEXTS AND TEACHING GUIDES

Masterton and Hurley, *Chemistry: Principles and Reactions*, 5th ed., Thompson, 2004.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

EARTH SCIENCE 1,2 (6023, 6024)

Grade level: 9–12

Prerequisites: Students must have achieved full high school status

Course duration: Two semesters

Subject area in which graduation credit is given: Science

Options for Instructional Settings: This course may also be taught in the following settings:

- Collaborative: 6023G, 6024G
- Sheltered: 6023L, 6024L

COURSE DESCRIPTION

College Preparatory Course (P). This two-semester, standards-based laboratory science course is intended primarily for grade 9 students enrolled in Algebra Exploration 9th 1,2 (4032, 4033). The course provides an overview of the areas of astronomy, chemistry, geology, oceanography, meteorology, and paleontology, and serves as a foundation for further study in physics, chemistry, biology, and environmental science. Students in this course will investigate and supplement their understanding by conducting and analyzing experiments, and using technology to collect data and communicate ideas. The course incorporates the state earth science standards for grades 9 through 12, as well as appropriate science investigation and experimentation standards for those grades.

BASIC TEXTS AND TEACHING GUIDES

Allison et al., *Holt Earth Science*, Holt, Rinehart and Winston, 2006.

SUPPLEMENTARY RESOURCES

Bernstein et al., *Earth Science: Concepts and Challenges*, Pearson Globe Fearon, 2003.

Science Safety Handbook for California High Schools, California Department of Education, 1999.

ENVIRONMENTAL SCIENCE 1,2 ADVANCED PLACEMENT (6455, 6456)

Grade level: 11–12

Prerequisites: Successful completion of Chemistry 1,2 and Biology 1,2, or equivalents

Course duration: Two semesters

Subject area in which graduation credit is given: Science; weighted (see note below)

COURSE DESCRIPTION

Honors Preparatory Course (HP). This advanced-level course is designed as the equivalent of a one-semester college-level course in environmental science. It provides students with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world, to identify and analyze environmental

problems, to evaluate the relative risks associated with these problems, and to examine solutions for resolving or preventing them.

Environmental Science 1,2 Advanced Placement will provide students with an additional laboratory science option at the advanced-placement level, as well as an opportunity to explore their local environments and global environmental issues. Students who normally do not enroll in advanced-placement-level courses may select this course as a result of their interest in environmental issues.

Note: Students who complete this course successfully but do not sit for the corresponding AP examination will receive *unweighted* credit, for course 6455U, 6456U. See Administrative Procedure 4770, section C.3.

BASIC TEXTS AND TEACHING GUIDES

Botkin and Keller, *Environmental Science*, Wiley, 2003.

MARINE SCIENCE 1,2 (6441, 6442)

Grade level: 11–12

Prerequisites: Successful completion of Biology 1,2 or equivalent and either physics or chemistry; interest in marine science

Course duration: Two semesters

Subject area in which graduation credit is given: Science

Options for Instructional Settings: This course may also be taught in the following settings:

- Special Education Collaborative: 6441G, 6442G
- Sheltered: 6441L, 6442L

Note: Special education students are offered an identical course (7777, 7778) that provides access to the core curriculum while allowing for accommodations in the pacing of course content

COURSE DESCRIPTION

College Preparatory Course (P). This course builds on the physical science and life science concepts learned in previous science courses and applies that knowledge to the exploration of the living and nonliving environments of our bays and oceans. Students will participate in a variety of learning experiences, including laboratory experiments, discussions, field trips, projects, independent research, and appropriate use of community

resources. Ethical and social issues related to the marine environment may be addressed.

BASIC TEXTS AND TEACHING GUIDES

Garrison, *Oceanography: An Invitation to Marine Science*, 6th ed., Thomson–Brooks/Cole, 2007.

SUPPLEMENTARY RESOURCES

Klemm et al., *The Fluid Earth*, 3rd ed., CRDG University of Hawaii, 1990.

Klemm et al., *The Living Ocean*, 3rd ed., CRDG University of Hawaii, 1995.

Science Safety Handbook for California High Schools, California Department of Education, 1999.

PHYSICS 1,2 (6311, 6312)

Grade level: 9–12

Prerequisites: Algebra 1-2

Course duration: Two semesters

Subject area in which graduation credit is given: Science

Options for Instructional Settings: This course may also be taught in the following settings:

- Sheltered: 6311L, 6312L
- Collaborative: 6311G, 6312G

Note: Special education students are offered an identical course (7779, 7780) that provides access to the core curriculum while allowing for accommodations in the pacing of course content.

COURSE DESCRIPTION

College Preparatory Course (P). This two-semester, algebra-based physics course is designed to provide an introductory experience with the processes of investigating the physical world and the understandings derived from that process. The emphasis is on developing a qualitative conceptual understanding of general principals and models and on the nature of inquiry. This course concentrates on conceptual development and provides an enriching laboratory experience; it can be taken by students in grades 9 and 10 as a first course in physics that prepares them for the more mathematically rigorous Advanced Placement physics courses. The core content addressed in this course includes the topics of motion and forces, the conservation of energy and momentum, heat and thermodynamics, waves and electric and magnetic phenomena.

This course meets college entry requirements for a laboratory science and addresses California state science standards.

BASIC TEXTS AND TEACHING GUIDES

Hewitt, *Conceptual Physics*, Prentice Hall, 2006.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

PHYSICS 1,2 ADVANCED (6321, 6322)

Grade level: 9–12

Prerequisites: Algebra 1-2 with a grade of A or B or Algebra 1-2 Advanced with a grade of C or better

Course duration: Two semesters

Subject area in which graduation credit is given: Science

Options for Instructional Settings: This course may also be taught in the following settings:

- Sheltered: 6321L, 6322L

COURSE DESCRIPTION

College Preparatory Course (P). This two-semester laboratory science course is more rigorous and mathematically demanding than the basic physics course. It is designed to provide an introductory experience to the processes of investigating the physical world and the understandings derived from those processes. The emphasis is on developing a qualitative conceptual understanding of general principals and models and of the nature of scientific inquiry. The core content addresses the topics of motion and forces, the conservation of energy and momentum, heat and thermodynamics, waves and electric and magnetic phenomena. These topics are presented using an inquiry-oriented, activity-based method. This course addresses California state science standards.

BASIC TEXTS AND TEACHING GUIDES

Zitzewitz et al., *Physics: Principles and Problems*, Glencoe, 2008.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

PHYSICS B 1,2 ADVANCED PLACEMENT (6391, 6392)

Grade level: 11–12

Prerequisites: Successful completion of or concurrent enrollment in Precalculus 1-2, Precalculus 1-2 Honors, or a higher-level mathematics course; background in chemistry, Physics 1,2, or recommendation of the teacher

Course duration: Two semesters

Subject area in which graduation credit is given: Science; weighted (see note below)

COURSE DESCRIPTION

Honors Preparatory Course (HP). This course is the equivalent of a general physics course usually taken in the first year of college. It provides a foundation for college students in the life sciences, premedicine, and some applied sciences, as well as in other fields not directly related to science. Students successful in this course gain in-depth understanding of physics concepts, significant laboratory experiences, and knowledge of current research directions, all of which prepare them for the *Advanced Placement Examination in Physics, Level B*. Students receive a weighted grade point average. Those scoring 3, 4, or 5 on the examination may earn college credit. All enrolled students are expected to take the AP test.

Note: Students who complete this course successfully but do not sit for the corresponding AP examination will receive *unweighted* credit, 6391U, 6392U. See Administrative Procedure 4770, section C.3.

BASIC TEXTS AND TEACHING GUIDES

Wilson and Buffa, *Physics*, Prentice Hall, 2003.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

PHYSICS C 1,2 ADVANCED PLACEMENT (6393, 6394)

Grade level: 11–12

Prerequisites: Successful completion of Precalculus 1-2, Precalculus 1-2 Honors, or concurrent enrollment in calculus or another higher-level mathematics course

Course duration: Two semesters

Subject area in which graduation credit is given: Science; weighted (see note below)

COURSE DESCRIPTION

Honors Preparatory Course (HP). This course is the equivalent of a college-level physics course that provides a foundation for college students who will major in the physical sciences or engineering. Methods of calculus are used wherever appropriate in formulating physical principles and in applying them to physical problems. The course is more intensive and analytic than AP Physics B. The subject matter of the Physics C course is mechanics and electricity and magnetism, with approximately equal emphasis in the two areas. Students successful in this course will be prepared for the *Advanced Placement Examination in Physics, Level C*. Students receive a weighted grade point average. Those scoring 3, 4, or 5 on the examination may earn college credit. All enrolled students are expected to take the AP test.

Note: Students who complete this course successfully but do not sit for the corresponding AP examination will receive *unweighted* credit, for course 6393U, 6394U. See Administrative Procedure 4770, section C.3.

BASIC TEXTS AND TEACHING GUIDES

Serway and Jewett, *Physics for Scientists and Engineers*, 7th ed., Cengage, 2008.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

PHYSIOLOGY 1,2 (6151, 6152)

Grade level: 11–12

Prerequisites: Physics 1,2 or Chemistry 1,2, and Biology 1,2, or equivalents

Course duration: Two-semester course

Subject area in which graduation credit is given: Science

COURSE DESCRIPTION

College Preparatory Course (P). The body systems of humans and animals are used as examples of systems necessary for the growth and maintenance of life. These systems are studied in terms of their general structures and functions in living things. Emphasis is placed on the evolutionary sequence of particular organs, tissues and functions so the student can grasp the concept of homology and the evidence

by which scientists unite organisms into evolutionary groups. The biochemical functions of human systems are covered in relation to human pathologies and wellness.

BASIC TEXTS AND TEACHING GUIDES

Tortora & Derrickson, *Principles of Anatomy and Physiology*, Peoples/John Wiley, 2005.

SUPPLEMENTARY RESOURCES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

**SCIENCE RESEARCH TECHNIQUES 1,2
(BIOLOGY, CHEMISTRY, OR PHYSICS)
(6431, 6432)**

Grade level: 10–12

Prerequisites: Satisfactory completion of a one-year course in the subject area involved; recommendation of teacher

Course duration: One- or two-semester course

Subject area in which graduation credit is given:
Elective

COURSE DESCRIPTION

College Preparatory Course (P). Highly recommended students will work on a one-to-one basis with a science teacher to acquire knowledge, skills, and attitudes necessary for careers in science. The teacher and student will develop an individualized syllabus showing the course content, state science standards to be addressed, and the research plan. Students will prepare equipment and materials for their own laboratory investigations. Students should enter their projects to be judged for the Greater San Diego Science and Engineering Fair.

BASIC TEXTS AND TEACHING GUIDES

Science Safety Handbook for California High Schools, California Department of Education, 1999.

Special Education Science Courses (Grades K–12)

Diagram of Districtwide Course Sequence, Grades 5–12

		Grade Level			
Middle School	5*	6*	7	8	
	Functional Science 5th (7110)	Functional Science 6th–8th (7112)			
High School			Applied Science/Health 7th–8th (7323)		
	9	10	11	12	
	Functional Science 9th–12th (7113)				
	Applied Science/Health 9th–10th (7324)		Applied Science/Health 11–12th (7325)		

* For middle school students in grades 5 or 6.

The following course descriptions are arranged **alphabetically**. Refer to the chart above for guidance.

APPLIED SCIENCE/HEALTH 7TH–8TH (7323)

Grade level: Middle or junior high school

Prerequisites: None

Course duration: Year course; multiple credit allowed

Subject area in which graduation credit is given:
Does not apply

COURSE DESCRIPTION

This course provides instruction in understanding good nutrition; personal hygiene; safety in the home, school, and community; basic first aid practices; appropriate use of prescription and nonprescription medicines; identification of medical services within the community; and conservation and pollution issues.

BASIC TEXTS AND TEACHING GUIDES

AGS *General Science*, Pearson AGS, 2004.

D’Onofrio, *Discover Decisions for Health, Level 7*, American Guidance Service, 1994.

Sammons, *Chow: A Simulation of Nutrition*, Interact, 1994.

Stella, *Cigarettes: The Cigarette on Trial*, Interact, 1994.

Stella, *Marijuana: Changing National Marijuana Policy?*, Interact, 1994.

Stella, *Alcohol: Expelling Students Who Drink?*, Interact, 1994.

Applied Science/Health 7–8 Teaching Modules, San Diego City Schools, 1995, Item No. 3085.

APPLIED SCIENCE/HEALTH 9TH–10TH (7324)

Grade level: 9–10

Prerequisites: None

Course duration: Year course; multiple credit allowed

Subject area in which graduation credit is given:
Elective

COURSE DESCRIPTION

This course provides instruction in understanding the relationship between people and their environment.

BASIC TEXTS AND TEACHING GUIDES

Marshall and Rosskups, *Earth Science 9*, American Guidance Service, 1997.

Jacobs and Marshall, *Physical Science 10*, American Guidance Service, 1997.

Applied Science/Health 9–10 Teaching Modules, San Diego City Schools, 1992, Item No. 3087.

APPLIED SCIENCE/HEALTH 11TH–12TH (7325)

Grade level: 11–12

Prerequisites: None

Course duration: Year course; multiple credit allowed

Subject area in which graduation credit is given: Elective

Note: The course number and elective credit for this course can be assigned to students who have completed course work but have not mastered all proficiency requirements for a parallel or identical special education science course

COURSE DESCRIPTION

This course provides instruction in medical and emergency care, with appropriate application to everyday living.

BASIC TEXTS AND TEACHING GUIDES

Life Skills Health Program, American Guidance Service, 1999.

Applied Science/Health 11–12 Teaching Modules, San Diego City Schools, 1993, Item No. 3090.

FUNCTIONAL SCIENCE K–6

FOCUS OF K–6 INSTRUCTION

Students develop individualized science, health, and safety skills within the domestic, vocational, recreation/leisure, core curriculum, and general community focus areas. Within the domestic area, for example, a student may be expected to follow oral/picture directions to prepare a meal safely; within the vocational area, a student may be expected to practice acceptable health standards; within the recreation/leisure area, a student may be expected to select appropriate attire according to a current weather report; within the general community area, a student may be expected to recognize danger signs, warning signs, labels, and survival signs. Within the core curriculum, students appropriately handle materials required in cooperative group lab activities, respond to and use

appropriate vocabulary, take turns in labs, and participate in cause/effect activities.

BASIC TEXTS AND TEACHING GUIDES

Peer Tutor Training Manual, San Diego City Schools, 1995–1996, Item No. 3111.

Controls and Choices for Students with Multiple Disabilities, San Diego City Schools, 1996, Item No. 3122.

Integrated Life Skills Curriculum Guide, San Diego City Schools, 1995, Item No. 2085.

Functional Science K–6, San Diego City Schools, 1996–1997, Item No. 3106.

FUNCTIONAL SCIENCE 5TH (7110)

Grade level: 5

Prerequisites: None

Course duration: Semester course; multiple credit allowed

Subject area in which graduation credit is given: Does not apply

COURSE DESCRIPTION

Students develop age-appropriate, individualized science skills within the context of the California alternate standards for students with moderate/severe disabilities. The instructional program emphasizes functional science activities, including identification of objects, comparison of the physical properties and attributes of objects, knowledge of basic weather, and the understanding of plants, animals, body parts, and senses. Adaptations may be utilized in order for students to access the content area. Generalization of functional science skills across school, home, and community environments is the desired outcome to maximize the student's independence and participation in all aspects of life.

BASIC TEXTS AND TEACHING GUIDES

Functional Science materials kit.

Thematic Modules, San Diego City Schools, 2000.

FUNCTIONAL SCIENCE 6TH–8TH (7112)

Grade level: 6–8

Prerequisites: None

Course duration: Year course; multiple credit allowed

Subject area in which graduation credit is given:

Does not apply

COURSE DESCRIPTION

Students develop age-appropriate, individualized science skills within the context of the California Standards for Students with Severe Disabilities, from which IEP goals are developed. A variety of high- and low-tech individual adaptations and modifications may be utilized in order for students to access the content area. Adaptations may be multi-sensory and multi-modality in nature.

Activities include participating in science-related adapted thematic literature units, participating in content area within the regular education school curriculum, and applying the skills within the school and neighborhood communities, such as dressing appropriately for the current weather. Generalization of these skills across school, home, and community environments is the desired outcome to maximize students' independence and participation in all aspects of their lives.

BASIC TEXTS AND TEACHING GUIDES

Functional Science 6th–8th materials kit.

Thematic Modules, San Diego City Schools, 2000.**FUNCTIONAL SCIENCE 9TH–12TH (7113)****Grade level:** 9–12**Prerequisites:** None**Course duration:** Year course; multiple credit allowed**Subject area in which graduation credit is given:**

Elective

COURSE DESCRIPTION

Students develop age-appropriate, individualized science skills within the context of the California Standards for Students with Severe Disabilities, from which IEP goals are developed. A variety of high- and low-tech individual adaptations and modifications may be utilized in order for students to access the content area. Adaptations may be multi-sensory and multi-modality in nature.

Skills include being aware of physical properties and relations within the environment, using the senses, and being aware of plants and animals. Activities include participation in science-related adapted thematic literature units, participation in content area within the regular education school curriculum, and applying these skills within the school, neighborhood, and vocational communities, such as dressing appropriately for the current weather. Generalization of these skills across school, home, and community environments is the desired outcome to maximize students' independence and participation in all aspects of their lives.

BASIC TEXTS AND TEACHING GUIDES

Functional Science 9th–12th materials kit.

Thematic Modules, San Diego City Schools, 2000.